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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
EWALD, MARIA VERONICA	

ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/750,534	DAVISON ET AL.	
	Examiner	Art Unit	
	MARIA VERONICA D. EWALD	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8,11 and 12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8,11 and 12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 October 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/12/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Okazaki, et al. (U.S. 4,723,903). Okazaki, et al. teach an apparatus comprising: an embossing tool substrate made of a first metal (item 1 – figure 3a and 3b; column 2, lines 65 – 66), a first major surface of the substrate having an embossing profile (figures 3a and 3b); a first coating over the first major surface of the substrate, the first coating providing an adherable surface (column 3, lines 1 – 3); and a second coating over the first coating, the second coating providing a non-adhesive outer surface (column 3, lines 5 – 7).

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by DePuydt, et al. (U.S. 6,030,556). DePuydt, et al. teach an apparatus comprising an embossing tool substrate made of a first metal, a first major surface of the substrate having an

embossing profile (item 42 – figure 4; column 1, lines 15 – 20; column 7, lines 1 – 5); a first coating over the first major surface of the substrate, the first coating providing an adherable surface (column 7, lines 10 – 15); and a second coating over the first coating, the second coating providing a non-adhesive outer surface (column 7, lines 59 – 65); wherein the first coating is further comprised of three layers (a dielectric layer and a patterning layer comprised of two distinct layers), wherein there is a first layer of a second metal deposited over the embossing tool substrate (column 7, lines 28 – 31, 45 – 50); a subsequent layer over the base layer of second metal (column 5, lines 25 – 35, 58 – 60); and the third layer (column 5, lines 58 – 60). Furthermore, the second coating, also known as the cap coating or cap layer is provided to reduce or prevent disruptions to the planarity of the patterning material layers of the first coating (column 7, lines 60 – 65). DePuydt, et al. further teach that the layers of the individual layers depends on the desired pit depth in the discs to be stamped or formed (column 6, lines 60 – 65).

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Homola, et al. (U.S. 2004/0202865 A1). Homola, et al. teach an apparatus comprising: an embossing tool substrate made of a first metal (item 110 – figure 1a; paragraph 0020), a first major surface of the substrate having an embossing profile (figure 1a); a first coating over the first major surface of the substrate, the first coating providing an adherable surface (item 130 – paragraph 0022); and a second coating over the first coating, the second coating providing a non-adhesive outer surface (item 120 – figure 1a; paragraph 0019).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2 – 3 and 5 – 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki, et al. or DePuydt, et al. in view of Ohman, et al. and further in view of Imatomi (U.S. 2006/0051453 A1). DePuydt, et al. teach the characeteristics previously described but do not teach the specific metals in a multi-layered stamper, comprised of a layer of a second metal, a layer of a metal oxide and a layer of a metal nitride, respectively. It is important to note, however, that Okazaki, et al. teach that the stamper can be comprised of multiple layers of metal film over the substrate base, the layers providing for strengthening adhesion or damping the stress encountered by the stamper and thus, prolonging its useful life. In addition, DePuydt, et al., do disclose the substrate with its multi-layered coating, such that the coating layers range in thickness from 10 – 200 nm. It is, therefore, known to one of ordinary skill in the art to apply metal or metal alloys in the formation of a substrate tool in layers and to ensure that such layers are very thin.

Ohman, et al. teach the use of a three-layered substrate, comprised of a base metal layer, a thin layer of a second metal with good electrical characteristics, and a hard, wear-resistant layer, providing good release characteristics when contacted against the plastic element to be embossed (column 19, lines 15 – 25). The outermost

wear-resistant layer consists of up to 5 micrometers (μm) of titanium nitride. In addition, Ohman, et al. teach that the respective layers should be fairly thin (< 20 μm or between 2 – 10 μm) to produce optimum results (column 18, lines 10 – 13). Furthermore, though the Applicant has claimed the specific thicknesses of 0.5 μm and 2 – 9 μm, the Applicant has not introduced specific reasoning for utilizing such thicknesses. On the other hand, Ohman, et al. has stated that practically, very thin layers produce optimum results. Therefore, one of ordinary skill in the art would conclude that optimum results and higher quality substrates are produced with thinner layers.

Furthermore, in a method to manufacture a metal mold device, Imatomi teaches that components of the mold may be produced with layers (paragraph 0090), wherein there is a base layer, an inner layer and an outermost layer. The inner and outermost layers may be made of zirconium oxide and/or zirconium nitride among other metal compounds that may be used. The use of zirconium nitride and oxide provides good wear-resistant characteristics and toughness (paragraph 0091).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to modify the layered substrate of either Okazaki, et al. or DePuydt, et al. with the zirconium oxide and zirconium nitride layers of Imatomi, et al., and ensuring that the layers are very thin, as taught Ohman, et al. for the purposes of providing layers, with toughness and good wear-resistance as taught by Imatomi and producing optimum results as taught by Ohman, et al.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki, et al. or DePuydt, et al. in view of Cheung, et al. (U.S. 6,210,514). DePuydt, et al. teach the characteristics previously described but do not teach that the second coating is comprised of polyparaxylylene.

In a method to fabricate thin film structures onto a substrate, Cheung, et al. teach the use of dielectric deposition of parylene C (paraxylylene), of 5 μm thick, onto the substrate (column 11, lines 35 – 37). The dielectric deposition of such a coating enhances moisture and chemical barrier properties of the finished assembly (column 11, lines 43 – 45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to use paraxylylene as the cap layer or second coating in the multi-layered stamper of either Okazaki, et al. or DePuydt, et al. for the purpose of maintaining the integrity and chemical properties of the patterning layer in the first coating.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki, et al. or DePuydt, et al. in view of Ohman, et al., further in view of Imatomi (U.S. 2006/0051453 A1) and further in view of Cheung, et al. Okazaki, et al., DePuydt, et al., Ohman, et al. and Imatomi teach the characteristics previously described but do not teach that the second coating is comprised of polyparaxylylene.

In a method to fabricate thin film structures onto a substrate, Cheung, et al. teach the use of dielectric deposition of parylene C (paraxylylene), of 5 μm thick, onto the

substrate (column 11, lines 35 – 37). The dielectric deposition of such a coating enhances moisture and chemical barrier properties of the finished assembly (column 11, lines 43 – 45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to use paraxylylene as the cap layer or second coating in the multi-layered stamper of Okazaki, et al. or DePuydt, et al. further configured with the multi-layered composition of Ohman, et al. and Imatomi, for the purpose of maintaining the integrity and chemical properties of the patterning layer in the first coating.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki, et al., DePuydt, et al. or Homola, et al. in view of Wago, et al. (U.S. 6,869,557). DePuydt, et al. and Homola, et al. do not explicitly teach that the apparatus for embossing is further comprised of a heater and a pressure apparatus; however, it is obvious that both of these elements are present in such typical embossing or stamping apparatus.

For example, in a method to emboss or stamp a disk during thermal imprint lithography, Wago, et al. teach the use of both a heating apparatus to heat the embossable substrate and stamper (figure 2) and a pressure apparatus to apply the necessary pressure (10 MPa shown) to adequately transfer the negative pattern from the stamper surface to the embossable substrate, producing the opposite, positive pattern on the substrate surface (figure 2).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to include with the embossing tool of Okazaki, et al., DePuydt, et al. or Homola, et al. both a heating apparatus and pressure apparatus to adequately perform thermal imprint lithography, wherein the heat is used to heat the stamper and disk or embossable substrate (allowing the deformation of the substrate surface) and wherein the pressure is used to adequately transfer the negative pattern on the stamper surface to the substrate surface, resulting in a positive or opposite pattern.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki, et al. in view of Imatomi. Okazaki, et al. teach the characteristics previously described, but do not specifically teach that the substrate is coated with a layer of zirconium and a layer of zirconium nitride over the layer of zirconium. It is important to note, however, that Okazaki, et al. teach that the stamper can be comprised of multiple layers of metal film over the substrate base, the layers providing for strengthening adhesion or damping the stress encountered by the stamper and thus, prolonging its useful life.

In a method to manufacture a metal mold device, Imatomi teaches that components of the mold may be produced with layers (paragraph 0090), wherein there is a base layer, an inner layer and an outermost layer. The inner and outermost layers may be made of zirconium oxide and/or zirconium nitride among other metal compounds that may be used. The use of zirconium nitride and oxide provides good wear-resistant characteristics and toughness (paragraph 0091).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the Applicant's invention to modify the layered substrate of Okazaki, et al. with the zirconium oxide and zirconium nitride layers of Imatomi, for the purposes of providing layers with toughness and good wear-resistance as taught by Imatomi.

Response to Arguments

15. Applicant's arguments filed December 12, 2007 have been fully considered but they are not persuasive. With respect to the reference of DePuydt, Applicant has argued that Applicant, in their previous response did not use the words "identical" or any assertion to the word "identical." The Examiner agrees to this point and clarifies what the Examiner meant by using the word "identical" relative to the table presented by Applicant. The table presented in the previous response and in the current arguments has been identified by Applicant as presenting similar qualities of materials of the dielectric layer and the cap layer of DePuydt. Applicant previously argued that the materials as listed by DePuydt do not suggest or teach any adherable or non-adherable qualities. The Examiner cited the listing of DePuydt to argue that materials for the dielectric layer and cap layer are identified as coming from the exact same listing of materials (i.e., identical); however, such a listing does not imply that the materials chosen for the dielectric and cap layers must necessarily be the same and thus, the dielectric layer and cap layer, if comprised of different materials, are also capable of possessing different qualities. The Examiner was not implying in the response that Applicant was using the word "identical" but was using the listing of DePuydt to show

that though *DePuydt lists identical materials, such materials for the cap layer and dielectric layer need not be the same and thus, can have different characteristics.*

Addressing whether DePuydt teaches adherable and non-adherable qualities, the Examiner disagrees with Applicant that DePuydt does not teach such qualities. First of all, DePuydt, et al. teach a substrate, which can be made of metal (column 7, lines 1 – 10), on which a dielectric layer is placed (item 44 – figure 4), of which the dielectric layer also serves to promote adhesion between the substrate and the patterning material (column 7, lines 40 – 45) and thus, the dielectric or first coating provides an *adherable surface. With respect to the non-adhesive qualities of the cap layer, because the cap layer contacts the disc being imprinted or embossed, the cap layer inherently possesses a releasable property or non-adhering property, such that it can easily be removed from the disc without deforming or warping the surface of the disc.*

With respect to the reference of Homola, Applicant has argued that the polymer coating 120 is capable of forming strong covalent bonds with the surface of metal or metal alloy stamper. Though true, Homola also teaches that the coating 120 on the stamper "may also exhibit high temperature resistance and thereby, enable repeated imprints of embossable films at elevated temperatures with effective surface separation from an embossed disk without significant material transfer" (paragraph 0029). Thus, the coating of Homola comprises *a non-adherable outer surface, because it results in effective surface separation between the stamper and the disk, wherein the stamper material is not transferred onto the disk surface.*

With respect to the reference of Okazaki, et al., Applicant has argued that the reference does not teach a first coating over the first major surface of the substrate and further teaches that the coatings(s) have holes. The Examiner disagrees. The substrate of Okazaki, et al. is produced with several coatings, which are placed over the first major surface of the substrate. Even though the coatings have holes does not take away from the fact that a major portion of the substrate remains coated. The examples cited in the reference teach a metal substrate coated with a chromium film and a molybdenum film or a nickel substrate placed on its surface with a gold film, then a nickel film, followed by a titanium film. Thus, the substrate is coated. Furthermore, Okazaki, et al. endeavors to solve the similar problem discussed in Applicant's specification. Applicant has discussed in pages 5 - 6 of the specification that the stamper is subjected to wear and tear and if provided with a hardened outer surface will last longer. Furthermore, Applicant states that a triple-coated stamper provides a hardened surface and reduces flaking or pealing. Simlarly, Okazaki, et al. teach that a multi-layered stamper with its thin layers over the substrate surface promotes in strengthening the adhesion between the layers or damping the stress encountered by the stamper and thus, prolonging its useful life (column 3, lines 1 – 5).

With respect to Applicant's arguments regarding the secondary references of Ohman, Imatomi, Cheung, and Wago, et al., and the use of the references as being non-analogous or without providing any teaching to combine such references with the primary references, the Examiner disagrees.

With respect to Ohman, the Examiner is citing Ohman, as teaching the criticality of thin layers of coatings, regardless of whether Ohman teaches that the substrate is not metal. The primary references of Okazaki, et al. and DePuydt already teach a metal substrate. Thus, Ohman is teaching the criticality of the layer thicknesses in a multi-layered substrate. Imatomi, though teaching an injection molding apparatus, teaches the advantages posed by using zirconium oxide and/or zirconium nitride. Similar to embossing, materials in injection molding are subject to high temperatures and stress and thus, one of ordinary skill in the art of metals or materials science, would be knowledgeable in the properties of metals and their applicability in different technologies. Cheung, et al., may teach a substrate used in a different technology, but still teaches a substrate with multi-layered films on its surface. Thus, the combination of references is maintained by the Examiner.

Conclusion

16. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARIA VERONICA D. EWALD whose telephone number is (571)272-8519. The examiner can normally be reached on M-F, 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yogendra N Gupta/
Supervisory Patent Examiner, Art Unit 1791

MVE